

FINAL DRAFT

**WATER QUALITY IMPROVEMENT
STRATEGIES
FOR THE EVERGLADES**

**ALTERNATIVE COMBINATIONS FOR THE
NORTH NEW RIVER CANAL BASIN**

February 27, 2002

**SOUTH FLORIDA WATER MANAGEMENT DISTRICT
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comments or questions.**

INTRODUCTION

The North New River Canal (NNRC) Basin has an area of approximately 30 square miles and is located in eastern Broward County. A map of the North New River Canal Basin, the basin tributary to the G-123 pump station, is presented in Figure 1. The NNRC Basin is located southeast of Water Conservation Area 2B, west of the Florida Turnpike and north of I-595 in Broward County. The “into” structure serving this basin is the G-123 pump station, located at State Road 27 and I-595. This structure is mainly used for water supply to WCA 3 and is not intended to be used for flood control. However, during large storm events, when storage is available in the water conservation areas, G-123 may be turned on to provide additional relief. For flood control, this basin is primarily served by the G-54 structure (Sewell Lock) located just west of the turnpike, which discharges to tide.

The project canals and control structures in the NNRC Basin have four functions: (1) to supply water to the basin during periods of low natural flow; (2) to convey excess water from Water Conservation Areas (WCAs) 2A, 2B, and 3A to tidewater (3) to intercept and control seepage from WCA 2B and (4) to provide flood protection and drainage of the NNRC Basin. There are three project canals in the NNRC Basin: the North New River Canal, the L-35A borrow canal, and C-42. There are eight project control structures regulating flow in the NNRC Basin: S-34, S-124, S-125, S-141, S-142, S-143, Sewell Lock (G-54) and G-123.

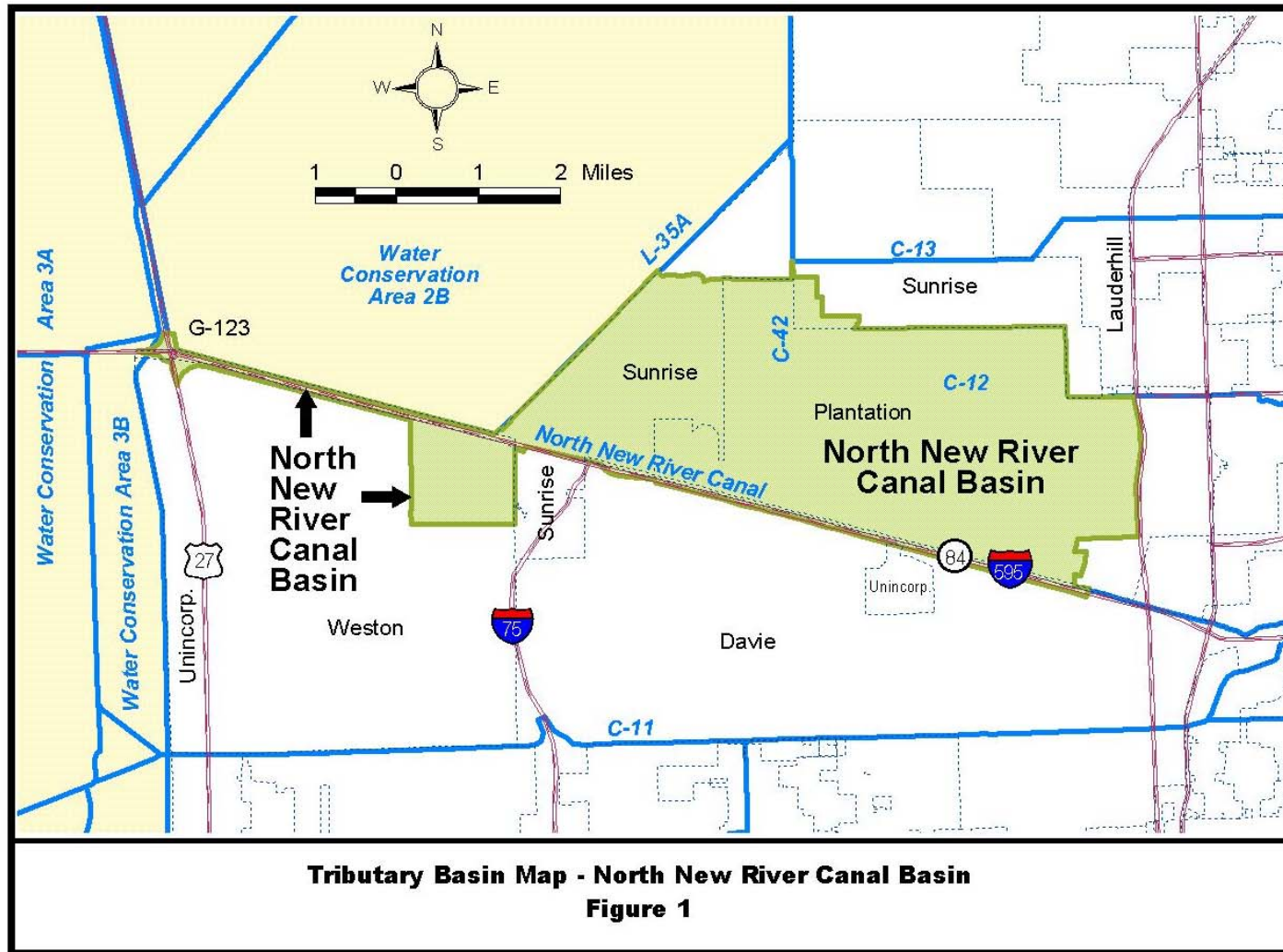
Land Use

The majority of the developed area (>85%) within the North New River Canal Basin is Residential and Commercial. There still exists a small portion of Agricultural area, mostly within the Plantation Acres Improvement District sub-basin. The remaining undeveloped wetlands, uplands and barren lands comprise approximately 4% of the total area or approximately 730 acres.

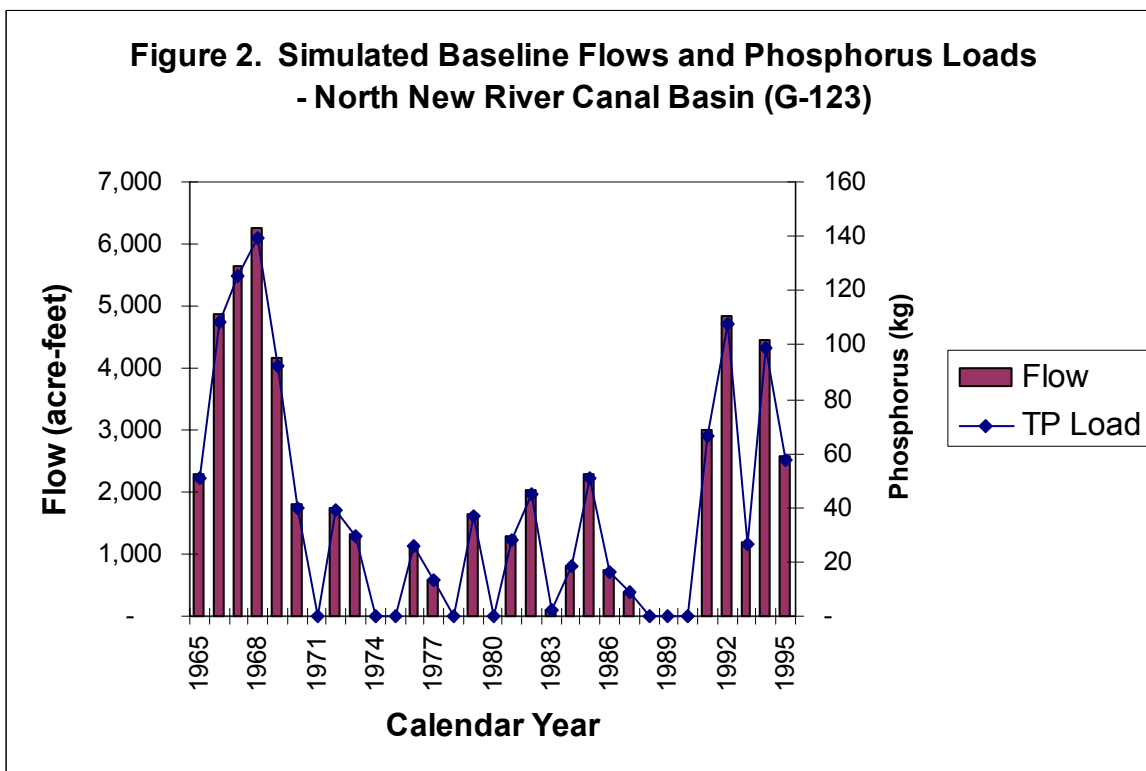
Flow Data

No historic flow data were available for G-123 during the period of record used to create the Baseline data set. Historic water quality data from the G-123 structure were compiled to generate the Baseline data set.

The G-123 Pump Station is a 4 unit structure with a maximum (all pumps operating) design discharge rate of 400 cfs. This structure is operated to pump seepage water from Water Conservation Area 2B, which would otherwise be discharged to tide, into WCA 3.



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Note: The Baseline Flows and Phosphorus Loads shown in Figure 2 is comprised of simulated flows from the South Florida Water Management Model (SFWMM) and observed water quality data from the ten-year period WY 90-99. To develop the Baseline flows, the SFWMM was used to simulate current operational conditions and utilized rainfall for the 31-year period between January 1, 1965 and December 31, 1995. The goal was not to recreate the 31-year period of record flows, but rather, to simulate the expected hydrologic response in the basin as a result of the 31-year rainfall history. The arithmetic average phosphorus concentration of 18 ppb was selected for use in the combined Baseline data set. *Reference: Baseline Data for the Basin-Specific Feasibility Studies to Achieve the Long-term Water Quality Goals for the Everglades, SFWMD, May 2001.*

It should also be noted that G-123 is not operated for the purposes of flood control, therefore, actual correlation between years of high rainfall and pump operation is more closely approximated by 50%.

ALTERNATIVES FOR THE NORTH NEW RIVER CANAL BASIN

Alternative combinations of operational changes, source control, basin-scale treatment and CERP projects for the NNRC Basin are presented below. Major components of the alternatives, along with probable influences on the flows and water quality of discharges are briefly described.

The load contribution of phosphorus from the G-123 pump station to the Everglades is approximately 40 kg per year. The concentration of TP in the effluent is generally lower than 20 ppb. The following alternatives assume implementation of a combination of source controls, such as Best Management Practices (BMPs), as a component in the reduction of phosphorus concentrations. Other components include basin level treatment or diversion. It is assumed that all alternatives will maintain existing levels of flood protection in the basin.

Alternative 1

- Source Control Component (Urban BMPs and Regulatory Program) (2006)
- Chemical Treatment Component (2006)
- CERP Component: Diversion structures (YY4) (2018)

Alternative 2

- Source Control Component (Urban BMPs and Regulatory Program) (2006)
- Discontinue use of G-123 (2006)
- CERP Component: Diversion structures (YY4) (2018)

Alternative 3

- Source Control Component (Urban BMPs and Regulatory Program) (2006)
- CERP Component: Diversion structures (YY4) (2018)

Note: Separable costs will be provided for previously purchased land(s) which are to be incorporated in alternatives.

Alternative 1 – Implement Best Management Practices (BMPs) and Construct Basin Level Chemical Treatment by 2006 until Implementation of CERP Component in 2018.**Description:**

- A. Source Control:** It is assumed that urban stormwater Best Management Practices (BMPs), as defined by the Everglades Stormwater Program, will be implemented in the North New River Canal Basin.
- B. Chemical Treatment:** This alternative includes constructing a chemical treatment facility by 12/31/2006. This facility would not require a large surface water storage area upstream of the treatment plant since the G-123 pump station is not intended to be used for flood control, only for water supply to WCA 3A and seepage return. However, this alternative would require land acquisition.
- C. Implementation of CERP Project:** CERP component YY4 includes construction of a basin divide across the North New River Canal at Markham Park. Canals will also be constructed to route water from the Bonaventure pump stations on the south side of the NNR Canal downstream of the proposed structure. This project would eliminate 100% of flows from the NNRC Basin to the G-123 pump station by 2018.

Influence on Flow:

- A. Source Control:** It is assumed that there will be no change in the Baseline flows associated with source controls.
- B. Chemical Treatment:** Since G-123 pump station operation is dependent upon the levels in the Water Conservation Areas, which are not affected by Alternative 1, there will be little if any effect of Alternative 1 on the flows through G-123 to the Everglades Protection Area. Therefore, it is assumed that the chemical treatment plant will have no effect on the Baseline flows.
- C. Implementation of CERP Project:** After the CERP project (WCA 2 and WCA 3 Diversion project) is implemented in 2018, it is assumed that flows through G-123 will be eliminated.

Influence on Water Quality:

- A. Source Control:** A source control sensitivity analysis will not be performed for this component.
- B. Chemical Treatment:** It is assumed that the chemical treatment facility will achieve a total phosphorus outflow concentration of 10 ppb regardless of the inflow concentration. As part of a sensitivity analysis, the chemical treatment effluent will be assumed to be 6 ppb and 8 ppb and the influence these concentrations, and the resultant blending of treated and untreated flows, have on the 50-year present worth cost will be evaluated and summarized. It is assumed that after the CERP project is implemented in 2018, the chemical treatment plant will no longer be needed.
- C. Implementation of CERP Project:** After the CERP project is implemented in 2018, it is assumed that loads through G-123 will be eliminated.

Costs:

- A. Source Control:** There will be no cost estimates developed for this component.
- B. Chemical Treatment:** This alternative will have additional costs associated with the construction of the chemical treatment facility and land acquisition.

C. Implementation of CERP Project: There will be no additional costs associated with this project.

Note: Separable costs will be provided for previously purchased land(s) which are to be incorporated in alternatives.

Alternative 2 – Discontinue use of G-123 Pump Station and Implement Best Management Practices (BMPs) by 2006 until Implementation of CERP Component in 2018.

Description:

- A. Source Control:** It is assumed that urban stormwater Best Management Practices (BMPs), as defined by the Everglades Stormwater Program, will be implemented in the North New River Canal Basin.
- B. Implementation of Operational Changes:** For this alternative, use of the G-123 pump station would cease until implementation of the CERP component in 2018.
- C. Implementation of CERP Project:** CERP component YY4 includes construction of a basin divide across the North New River Canal at Markham Park. Canals will also be constructed to route water from the Bonaventure pump stations on the south side of the NNR Canal downstream of the proposed structure. This project would eliminate 100% of flows from the NNRC Basin to the G-123 pump station.

Influence on Flow:

- A. Source Control:** It is assumed that there will be no change in the Baseline flows associated with source controls.
- B. Implementation of Operational Changes:** After the G-123 pump station is shut down, seepage from WCA 2B and flows from the developed areas of the North New River Canal Basin to the Everglades Protection Area will be diverted east through the G-54 Structure and to tide. Water supply would no longer be available for WCA 2B.
- C. Implementation of CERP Project:** It is assumed that after the CERP project comes on line, flows through G-123 will be eliminated.

Influence on Water Quality:

- A. Source Control:** Source controls will be implemented by 2006 to reduce phosphorus in the basin, however, a sensitivity analysis is not required for this alternative since the phosphorus loading would be zero.
- B. Implementation of Operational Changes:** After the G-123 pump station is shut down, loads from the developed areas of the North New River Canal Basin to the Everglades Protection Area will be eliminated.
- C. Implementation of CERP Project:** After the CERP Project is implemented, phosphorus loads through G-123 will continue to be eliminated.

Costs:

- A. Source Control:** There will be no cost estimates developed for this component.
- B. Implementation of Operational Changes:** It is assumed that there will be no additional costs associated with this alternative.
- C. Implementation of CERP Project:** There will be no additional costs associated with this project.

Alternative 3 – Implement Best Management Practices by 2006 until Implementation of the CERP Project Basin Divide in 2018.

Description:

- A. Source Control:** It is assumed that urban stormwater Best Management Practices (BMPs), as defined by the Everglades Stormwater Program, will be implemented in the North New River Canal Basin.
- B. Implementation of CERP Project:** CERP component YY4 includes construction of a basin divide across the North New River Canal at Markham Park. Canals will also be constructed to route water from the Bonaventure pump stations on the south side of the NNR Canal downstream of the proposed structure. This project would eliminate 100% of flows from the NNRC Basin to the G-123 pump station.

Influence on Flow:

- A. Source Control:** It is assumed that there will be no change in the Baseline flows associated with source controls.
- B. Implementation of CERP Project:** Prior to the CERP project coming on line, the inflows through the G-123 pump station should be the same as the Baseline data set. After the CERP project comes on line, flows through G-123 will be eliminated.

Influence on Water Quality:

- A. Source Control:** As part of a sensitivity analysis, the phosphorus load associated with discharges to the EPA from the NNRC Basin (derived from the Baseline data set) will be reduced by 25%. The influence that this reduction has on the outflow phosphorus concentration and load will be calculated and summarized.
- B. Implementation of CERP Project:** After the CERP Project is implemented, phosphorus loading through G-123 will be eliminated.

Costs:

- A. Source Control:** There will be no cost estimates developed for this component.
- B. Implementation of CERP Project:** There will be no additional costs associated with this project.

APPENDIX A

A1.0 Source Control and BMPs

Source control will require the implementation of a comprehensive and basin-wide pollution prevention plan. The plan must include regulation promulgation, public education, hiring and equipping maintenance personnel, infrastructure improvements and hiring compliance and enforcement staff.

Urban Best Management Practices (BMPs) are management practices for urban areas designed to reduce pollution through point and non-point source stormwater discharges. Examples include landscaping maintenance, illicit discharge controls, drainage controls and detention ponds.

Regulatory Programs are developed to improve water quality, including identifying structures or systems requiring permits or modifications to permits. Regulatory programs may include any combination of voluntary BMPs, requirement and/or modification of permits, construction projects and basin-specific regulatory programs to achieve compliance with state water quality standards.

A2.0 Overview of NNRC

The North New River Canal Basin is comprised of six (6) sub-basins as shown in Figure A-1. Sampling points are shown where water quality samples have been taken to determine “hot spots” in the basin. Once these areas of special concern are identified, a program of implementing BMPs will be designed to improve the water quality of the discharges. The characteristics of each sub-basin will be considered separately. Table A-1 lists the results of the sampling program in the NNRC Basin to date.

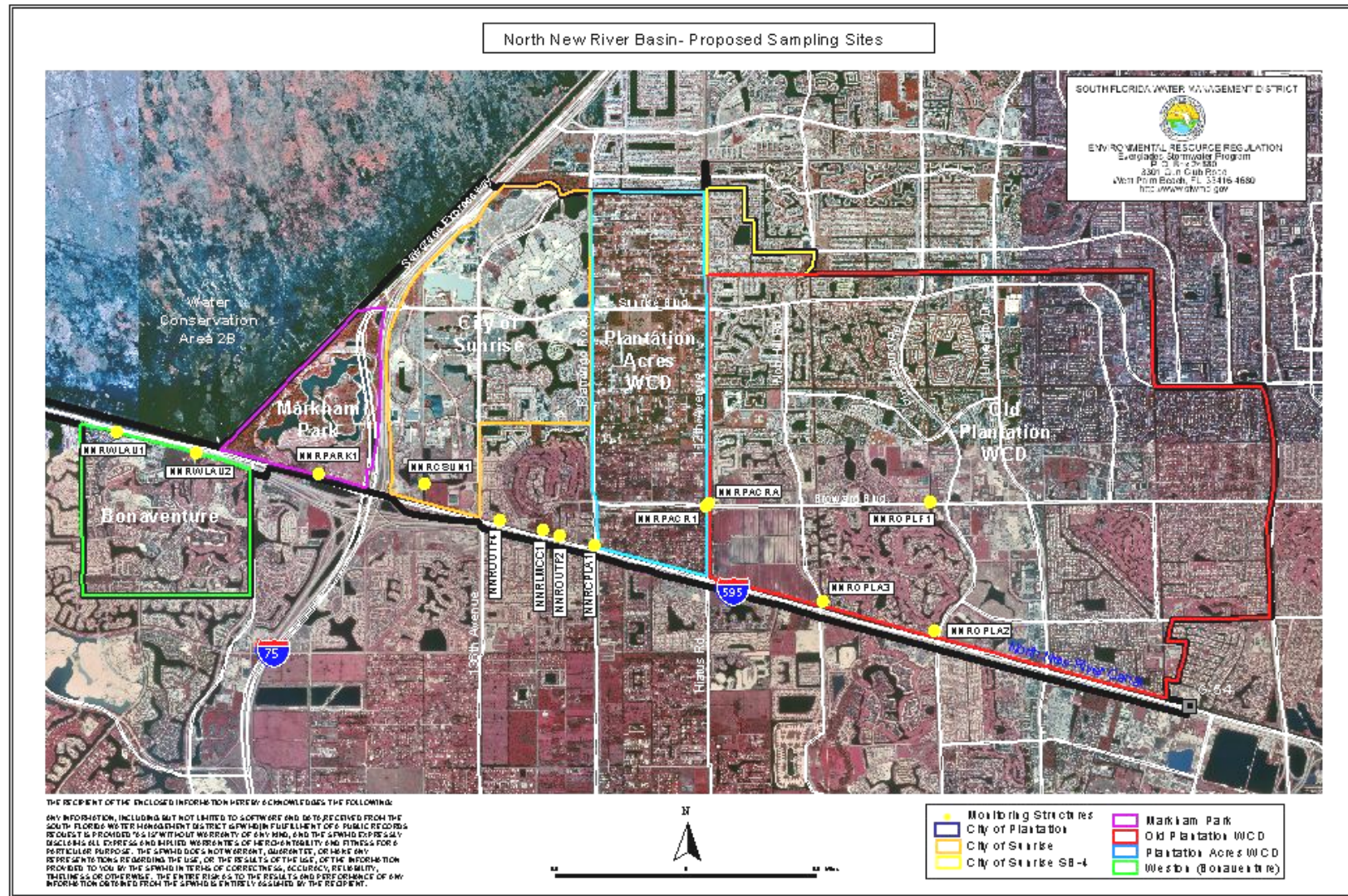
Examples of general BMPs to be implemented in the sub-basins are given in Sections A3.0 and A4.0 for Old Plantation Water Control District and Plantation Acres Improvement District, respectively.

TABLE A-1
NNRC Sampling Program Results

Sampling Date	5/24/01	7/24/01	8/2/01
Site			
NNRPARK1	15	14	
NNROPLF1	18	34	
NNROPLA2			59
NNROPLA3			48
NNRPACRA	30	18	25
NNRPACR1			62
NNRCPLA1		130	25
NNRLMCC1	75	43	
NNROUTF2			
NNROUTF4			
NNRCSUN1	103	27	
NNRWLAU1			24
NNRWLAU2			54

Markham Park
 OPWCD Floater
 OPWCD Pump 2
 OPWCD Pump 3
 PAID at Broward and C-42
 PAID Pump 1
 City of Plantation at Flamingo and NNR
 Lago Mar CC
 Private Outfall in Plantation
 Private Outfall in Plantation
 City of Sunrise Pump at NNR
 West Lauderdale Pump 1
 West Lauderdale Pump 2

FIGURE A-1 NNRC Sub-Basins



A3.0 Old Plantation Water Control District

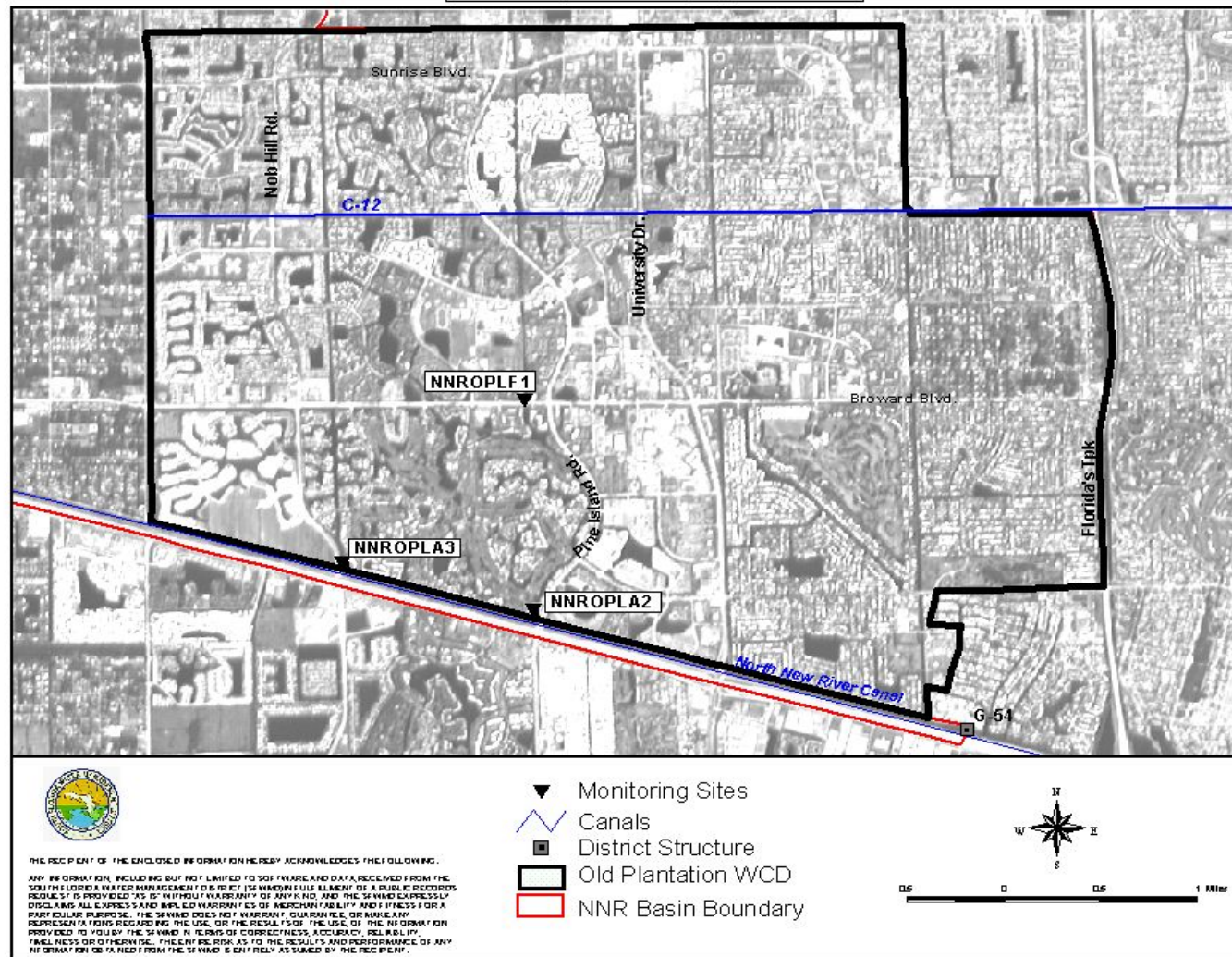
Old Plantation Water Control District (OPWCD) is located in the easternmost portion of the NNRC Basin and comprises approximately half of the total basin area. OPWCD is a mostly residential area with a large percentage of surface water storage area and operates 3 pump stations discharging to the NNR Canal under Permit No. 06-00185-S.

Proposed BMPs to be implemented would include additional detention of stormwater, which would include operational changes, and public education as to the use of fertilizer, landscaping practices, maintenance activities and illicit dumping.

The South Florida Water Management District has entered into a cooperative cost-share agreement with OPWCD to implement a program of sampling and Best Management Practices to improve the water quality of the discharges by 2006. Figure A-2 is a map of the sub-basin.

FIGURE A-2

Old Plantation Water Control District
Proposed Sampling Sites



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A4.0 Plantation Acres Improvement District

Plantation Acres Improvement District (PAID) is located along the west bank of the C-42 Canal, immediately west of OPWCD. It is approximately 1 mile wide and 3.5 miles north to south. PAID is a residential area with several equestrian communities and a small portion of other agricultural activities. Most of PAID is on septic systems, which can contribute significantly to increased phosphorus levels in the discharges. PAID operates 6 pump stations discharging to the C-42 Canal under Permit No. 06-00472-S.

In the case of PAID, proposed BMPs to be implemented would not include additional detention of stormwater due to the large percentage of low-lying area in this basin. However, Public Education as to the use of fertilizer, landscaping practices, maintenance activities and illicit dumping, as well as implementation of BMPs relating to equestrian communities and septic systems, can contribute to improvement of the water quality of the effluent.

The South Florida Water Management District has entered into a cooperative cost-share agreement with PAID to implement a program of sampling and Best Management Practices to improve the water quality of the discharges by 2006. Figure A-3 is a map of the sub-basin.

FIGURE A-3